# EFFECTS OF INTERIM FLOWS FROM GLEN CANYON DAM ON THE AQUATIC RESOURCES OF THE LOWER COLORADO RIVER FROM DIAMOND CREEK TO LAKE MEAD

**Quarterly Report No. 9**
**Trip No. 9: May 26 - June 7, 1994**

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## INTRODUCTION

This report presents preliminary results from Trip 9, 1994 of the Hualapai Aquatic Resources Study. Included in the report are a summary of trip logistics, personnel, data collected, observations, and recommendations. Most information is presented in tables to provide a synopsis of trip details. These data are hand tabulated and should be considered preliminary. Data will subsequently be computerized and checked for accuracy. The purpose of these trip reports is to provide information from BIO/WEST trips as quickly as possible to aid other researchers.

## LOGISTICS, RESEARCH SCHEDULE, AND PERSONNEL

Trip 9 was conducted May 26 - June 7, 1994, from Diamond Creek (RM 226) to Pearce Ferry (RM 280) on Lake Mead. Six campsites were established and sampling was conducted in the areas indicated in Table 1. We camped above 234 Mile Rapid and sampled the river upstream of this location for the first time during this study. Sampling was also conducted in Diamond Creek near the launch site. Table 2 is a list of personnel who participated in research activities during Trip 9.

## DATA COLLECTED

### Fish

A summary of fish-sampling effort by gear type is presented in Table 3. Trammel nets, and boat-electrofishing (EL 220v DC) were used in the main channel of the Colorado River. Backpack electrofishing, minnow trapping, and hoop net sets were only used in tributaries.

Overall number of fish captured from the main channel and Spencer Creek were low relative to other trips (Table 4). Extremely clear water in the mainstem and very low discharge from Spencer Creek may have contributed to the low capture rate. Lake Mead level was the lowest it has been in two years and may have contributed to the low catch rate. Moderately strong current was present past Pearce Ferry, therefore, no lake habitat was sampled during Trip 9.

Multiple-pass removals (population estimate) were conducted at three sites in Spencer Creek. The two previously sampled sites (Sites 1 and 2) were resampled. The location of Site 3 was moved downstream and is now designated as 3A. Site 3A is above the high-gradient section of Spencer Creek that seems to form a barrier to non-native fish. For the second trip in a row only speckled dace were taken above this barrier. The dace upstream of this barrier are more robust (in better condition) than those from Sites 1 and 2. This may be indicative of competition between dace and non-native fish (primarily red shiners) at Sites 1 and 2. Results from the multiple pass backpack electrofishing efforts as well as incidental backpack electrofishing efforts in Spencer and Surprise Creeks are presented in Table 5.

Fish species composition and relative abundance approximated previous trips with the exception of the capture and observation of a large number of flannelmouth suckers. Several juvenile flannelmouths were observed while snorkeling in the pools in Surprise Creek. Five juvenile flannelmouths were captured in minnow traps and hoop nets in Surprise Creek. Thirteen PIT-taggable flannelmouths (>150 mm TL) were captured from the main channel and Spencer Creek during this trip. One of these was a recapture. This female was originally captured at RM 156.93 on May 27, 1993, or about 1 year before, by Arizona Game and Fish Department. This female

moved about 88 miles downstream, from the mouth of Havasu Creek to the mouth of Spencer Creek, and expressed eggs at recapture. PIT tag numbers, capture locations, and fish measurements are listed below. No endangered humpback chub (Gila cypha) or razorback sucker (Xyrauchen texanus) were captured or observed during Trip 9.

| Species | PIT-tag | RM | TL (mm) | Weight (g) | Sex | Recapture |
|---|---|---|---|---|---|---|
| Flannelmouth | 7F7D17311C | 245.3 | 534 | 1439 | F | Yes |
| Flannelmouth | 7F2F384D2D | Spencer | 229 | 97 | M | No |
| Flannelmouth | 1F1F586307 | Spencer | 271 | 178 | M | No |
| Flannelmouth | 1F1F642A34 | Spencer | 242 | 119 | M | No |
| Flannelmouth | 1F1F777457 | Spencer | 172 | 38 | M | No |
| Flannelmouth | 7F7B022D36 | Spencer | 198 | 68 | M | No |
| Flannelmouth | 7F7D400379 | 246.0 | 365 | 478 | F | No |
| Flannelmouth | 7F7F3E6713 | 253.0 | 351 | --- | F | No |
| Flannelmouth | 7F7F1F7C4F | 260.2 | 323 | 323 | F | No |
| Flannelmouth | 7F7B02444C | 260.2 | 336 | 306 | M | No |
| Flannelmouth | 7F7F287B4B | 259.0 | 379 | 515 | M | No |
| Flannelmouth | 7F7F6A5404 | 260.3 | 243 | 140 | F | No |
| Flannelmouth | 7F7F273379 | 265.2 | 418 | 758 | M | No |

The small hoop net was set overnight in the mouths of Surprise, Lost, and Quartermaster creeks. The common fish species were taken from Surprise and Lost. The Quartermaster hoop set captured only 11 juvenile channel catfish. A large crayfish was captured and preserved during an electrofishing run near the mouth of Quartermaster Creek.

Many carp captured from the mainstem were expressing milt and a few were expressing eggs. Striped bass were routinely captured from the main channel from RM 245.3 downstream. Striped bass appeared to be in better condition than during the previous trip. Stomachs were removed from striped bass and channel catfish captured in the main channel and in Spencer Creek to evaluate food habits of these fish. Scale samples were also taken from striped bass to help establish an age-length relationship.

Water Quality

Water quality parameters in the main channel were measured with a Hydrolab Surveyor 2 and manually recorded at each campsite. Parameters recorded included water temperature, pH, conductivity, and dissolved oxygen. Water temperature in the Colorado River ranged from 16.07 to 20.29°C during this trip.

In addition, a Hydrolab Surveyor 2 with a DataLogger, recording the above parameters every 30 minutes, was deployed in Spencer Creek for 3.5 days. Water temperatures in Spencer Creek varied from a low of 17.59°C to a high of 30.59°C.

The Ryan Tempmentors were not downloaded during Trip 9, however, it was noted that the one in Spencer Creek was occupying a spring area where temperatures were 3.5°C cooler than the main creek. This tempmentor was moved to a more suitable location.

Turbidity in the main channel of the Colorado was measured using a standard Secchi disc. Secchi readings were taken in the sun between 1000 to 1400. Main channel turbidity was very low during most of the trip with main channel Secchi readings from 2.5-1.5 m the majority of the time. Secchi depth in the Colorado River decreased to 0.3 m on two occasions lasting only several hours. The greatest Secchi depths (clearest water) in the main channel occurred during the steady 8000 cfs flows. The clear conditions in the main channel were a probable factor in our low catch rate of fish.

Discharge was measured in Spencer Creek at three separate sites. Cross sections of the main channel in each of the four longitudinal sample strata were charted with a fathometer.

Primary/Secondary Productivity

Four sets of drift samples were taken in the main river. Drift was also taken in Spencer Creek. Stream benthos were collected using a Surber sampler in Spencer Creek at the three multiple pass sample sites. Surbers from the multiple pass sites will be used to approximate algal standing crop as well as stream benthos. Stream benthos and algae were also collected from six Hess samples taken from the mouth of Spencer Creek.

River Stage Monitoring

Changes in river stage was recorded at one location. River level was monitored at RM 245.3 (river right) where a change of 52 cm was recorded over a 36-hour period.

## OBSERVATIONS

1. Fish densities in Spencer Creek were some of the lowest observed since multiple pass sampling began one year ago. This may be due to the low flow and abundant algal growth present in the creek.

2. Striped bass captured during this trip seemed to be in better condition than those captured during the previous trip (8).

3. Sampling above the barrier in Spencer Creek again produced only speckled dace. These fish were in better condition than speckled dace occurring with non-natives below the barrier. Competition with red shiners and fathead minnows may be a factor in the condition of speckled dace.

4. Surprise Creek seems to be an important nursery area for flannelmouth suckers. Five juveniles were captured and other juveniles observed during snorkeling observations in the creek.

5. Surprise Creek seems to harbor more fathead minnows than Spencer Creek.

6. A hoop net in the mouth of Quartermaster Creek produced only eleven juvenile channel catfish. Minnow traps set in the creek produced no fish.

7. Due to the level of Lake Mead, riverine habitat extends downstream of Pearce Ferry. No lake habitat was sampled during Trip 9.

8. There was evidence of spawning activity by carp in the main channel

## RECOMMENDATIONS

- Continue our intensive sampling of Spencer Creek including 3 multiple pass sites and incidental areas.

- Clarify the factors that make Surprise Creek an important nursery for flannelmouth suckers.

- Continue monitoring mainstem sites, particularly the areas where native fish have been PIT-tagged.

- Continue to sample the area where the humpback chub (RM 253.2) was collected in October 1993, and sample similar habitats in other locations.

**Table 1. Dates, campsites, and sample locations for Trip No. 9, May 26 - June 7, 1994.**

| Date | Camp Site | Sample Locations |
|---|---|---|
| May 26-27 | RM 233.7<br>Above 234 Mile Rapid | RM 232.5 - 233.6 |
| May 27-June 1 | RM 245.3<br>Upstream of Spencer | RM 244.8-248.9 including Spencer Creek. (RM 246), Surprise Creek (RM 248.6) |
| June 1-3 | RM 250.3<br>Shady Ledges | RM 250.6-253.2 and the mouth of Lost Creek (RM 248.9) |
| June 3-4 | RM 259.8<br>Quartermaster Creek | RM 259.5-261.2 and the mouth of Quartermaster Creek |
| June 4-5 | RM 265<br>Upstream of Bat Caves | RM 264.3-266.3 |
| June 5-7 | RM 274.3<br>Emory Falls | RM 273.3-274.8 |

RM = River Mile

**Table 2. Personnel participating in Trip No. 9, May 26 - June 7, 1994.**

| Personnel | Affiliation | DATES |
|---|---|---|
| Gloria Hardwick | BIO/WEST, Inc. | 05/26 - 06/07 |
| John Olewine | BIO/WEST, Inc. | 05/26 - 06/07 |
| Bill Leibfried | BIO/WEST AND HNRD | 05/26 - 06/07 |
| Ben Zimmerman | Hualapai Natural Resources Department | 05/26 - 06/07 |
| Jesse Powsey | Hualapai Natural Resources Department | 05/26 - 06/07 |
| Lars Neimi | OARS | 05/26 - 06/07 |
| Dennis Silva | OARS | 05/26 - 06/07 |
| Melissa Richmond | OARS | 05/26 - 06/07 |

**Table 3. Fish sample gears, codes, descriptions, and number of samples from the Lower Grand Canyon and Lake Mead.**

| SAMPLE GEAR CODE - DESCRIPTION | TOTAL NUMBER SAMPLES |
|---|---|
| Electrofishing | |
| EL - 220-v DC (Coffelt CPS) | 33 |
| EL - Backpack Coffelt | |
| Multiple pass | 3 |
| Single pass | 12 |
| Trammel Nets | |
| TK - 75'x6'x1"x12" | 9 |
| TN - 50'x6'x1.5"x12" | 49 |
| TL - 75'x6'x1.5"x12" | 28 |
| Minnow Traps | |
| MT - commercial minnow traps | 34 |
| Hoop Nets | |
| HS - small hoop net 2' diameter | 4 |
| Seines | |
| SA - 10'x3'x1/8" seine | 4 |
| Angling | |
| Total efforts - 4.5 hours | 3 |
| Total | 179 |

**Table 4. Numbers of fish by species captured during Trip No. 9 in the Lower Grand Canyon and Lake Mead Inflow.**

| FAMILY<br>COMMON NAME (Code) | SCIENTIFIC NAME | TOTAL CAPTURED |
|---|---|---|
| CYPRINIDAE (minnows) | | |
| red shiner (RS) | Cyprinella lutrensis | 862 |
| fathead minnow (FH) | Pimephales promelas | 110 |
| common carp (CP) | Cyprinus carpio | 144 |
| speckled dace (SD) | Rhinichthys osculus | 451 |
| CATOSTOMIDAE (suckers) | | |
| flannelmouth sucker (FM) | Catostomus latipinnis | 21 |
| PERCICHTHYIDAE (temperate basses) | | |
| striped bass (SB) | Morone saxatilis | 36 |
| ICTALURIDAE (catfishes) | | |
| channel catfish (CC) | Ictalurus punctatus | 65 |
| CYPRINODONTIDAE (killifish) | | |
| plains killifish (PK) | Fundulus zebrinus | 3 |
| CENTRARCHIDAE (sunfishes) | | |
| largemouth bass (LB) | Micropterus salmoides | 4 |
| TOTAL | | 1,696 |

**Table 5. Numbers of fish by species captured during Trip 9 by backpack electrofishing in Spencer and Surprise Creeks. Sites 1 through 3a in Spencer Creek correspond to locations of multiple-pass sampling (see text for explanation of sites).**

| | Spencer Creek | | | | Surprise Creek |
|---|---|---|---|---|---|
| Fish species | Site 1 | Site 2 | Site 3a | Other | All locations |
| Red shiner | 53 | 55 | 0 | 0 | 74 |
| Fathead minnow | 0 | 0 | 0 | 0 | 60 |
| Common carp | 0 | 2 | 0 | 0 | 31 |
| Speckled dace | 50 | 91 | 154 | 144 | 0 |
| Flannelmouth sucker | 0 | 4 | 0 | 1 | 3 |
| Channel catfish | 0 | 5 | 0 | 4 | 1 |
| Plains killifish | 2 | 0 | 0 | 0 | 0 |
| Green sunfish | 0 | 0 | 0 | 0 | 1 |
| Black bullhead | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 105 | 157 | 154 | 149 | 140 |